**LEMBAR**
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**KARYA ILMIAH :** .Prosiding Internasional Terindex Scopus

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| Judul Publikasi Ilmiah (Artikel) | | : | Desalination of Sea Water Using Polymer Inclusion Membran (PIM) With Aliquat 336-TBP (Tributhyl Phosphate) as Carrier Compound |
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| Status Pengusul | | : | penulis pertama/utama |
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| | b. Nomor ISBN /ISSN | | ISBN : 19366612, 19367317 |
| | c. Volume, Nomor, Bulan, Tahun | | 156 (2018) |
| | d. Penerbit | | EDP Sciences |
| | e. DOI artikel (jika ada) | | https://doi.org/10.1051/matecconf/201815608004 |
| | f. Alamat web jurnal | | https://www.matec-conferences.org/ |
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**LEMBAR**
**HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW***
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|---|---|---|---|
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# Document details





MATEC Web of Conferences
Volume 156, 14 March 2018, Article number 08004
24th Regional Symposium on Chemical Engineering, RSCE 2017; Patra Hotel and ConventionSemarang; Indonesia; 15 November 2017 through 16 November 2017; Code 135293

## Desalination of Sea Water Using Polymer Inclusion Membran (PIM) with Aliquat 336-TBP (Tributhyl Phosphate) as Carrier Compound (Conference Paper) (Open Access)

Cholid Djunaidi, M. ✉, Fauzi, H., Hastuti, R.

Save all to author list

Departement Chemistry, Faculty Sains and Mathematica, Diponegoro University, Indonesia

## Abstract

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Desalination of Sea Water using Polymer Inclusion Membrane has been done. PIM is known has high stability membrane to overcome the instability of liquid membrane. PIM was placed among two phase: source phases was sea water and feed phases was aquadest. Efficiency of desalination is known by determining salinity concentration and ion $Na^+$ in feed phases and stripping phases using refractometer and AAS. while membrane characterization is done using FTIR. SEM and UV-Vis spectroscopy. The PIM membrane that is produced has thin. transparent. clear and flexible properties. The result showed that PIM transport for 24 hours give the highest of salinity transport. there are 92.68% is transported from feed phases and 84.87% in stripping phases. Membrane characterization result by FTIR and UV spectroscopy showed that PIM membrane is stable enough. © The Authors, published by EDP Sciences, 2018.

## SciVal Topic Prominence

Topic: Liquid membranes | Extraction | Membrane ELM

Prominence percentile: 95.306

## Chemistry database information

### Substances

Na

## Indexed keywords

Engineering controlled terms: Desalination | Fourier transform infrared spectroscopy | Membranes | Thallium alloys | Ultraviolet spectroscopy | Ultraviolet visible spectroscopy

Engineering uncontrolled terms: Membrane characterization | Polymer inclusion membranes | Polymer inclusions | Stripping phasis | Two phase | UV-vis spectroscopy

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DEPARTMENT OF CHEMICAL ENGINEERING
DIPONEGORO UNIVERSITY

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Patra Jasa Hotel, Semarang, Indonesia

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## The 24th Regional Symposium on Chemical Engineering (RSCE 2017)

**Semarang, Indonesia, November 15-16, 2017**

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PDF (687 KB) | References

# Optimized Ultrasound-Assisted Oxidative Desulfurization Process of Simulated Fuels over Activated Carbon-Supported Phosphotungstic Acid

*Peniel Jean* Gildo[1], *Nathaniel* Dugos[1,*], *Susan* Roces[1] and *Meng-Wei* Wan[2]

[1]Chemical Engineering Department, De La Salle University – Manila, 2401 Taft Avenue, Malate, Manila, Philippines, 0922
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**Abstract.** Recent technological advancements respond to the call to minimize/eliminate emissions to the atmosphere. However, on the average, fuel oils which is one of the major raw materials, is found to increase in sulfur concentration due to a phenomenon called thermal maturation. As such, a deeper desulfurization process is needed to obtain low/ultra-low sulfur fuel oils. In the present study, the ultrasound assisted oxidative desulfurization (UAOD) processes using the $H_2O_2$ and HPW-AC oxidizing system applied to simulated fuel (~2800 ppm sulfur in the form of dibenzothiophene, benzothiophene, and thiophene dissolved in toluene), were optimized. After the pre-saturation of the HPW-AC with the simulated fuel, $H_2O_2$ was added just before the reaction was commenced under ultrasonic irradiation. After the application of both $2^k$-factorial design of experiment for screening and Face-Centered Design of Experiment for optimization, it was found that 25.52 wt% of $H_2O_2$ concentration, 983.9 mg of catalyst dose, 9.52 mL aqueous phase per 10 mL of the organic phase and 76.36 minutes of ultrasonication time would render 94.74% oxidation of the sulfur compounds in the simulated fuel. After the application of the optimized parameters to kerosene and employing a 4-cycle extraction using acetonitrile, 99% of the original sulfur content were removed from the kerosene using the UAOD optimized parameters. The desulfurization process resulted in a low-sulfur kerosene which retained its basic fuel properties such as density, viscosity and calorific value.

## 1 Introduction

Sulfur oxides ($SO_x$) and particulate matter (PM) are one of the criteria pollutants set by the United States Environmental Protection Agency that significantly contributes to air pollution. These are particularly emitted by processes utilizing raw materials such as crude oils and metal ores – in which sulfur is prevalent. Legislative efforts have been exerted by various countries and regions to prevent the addition of these criteria pollutants to the atmosphere. Developed countries such as Japan, USA, Canada and the European Union have set a 50 ppm sulfur (low-sulfur oil, Euro IV) limit for its petroleum products while Taiwan has implemented a 10 ppm sulfur limit (ultra-low sulfur oil, Euro V). The Philippines has recently implemented its Euro IV Standard in the mid-2016s.

Although efforts have been done to decrease the emission of sulfur pollutants, scientists and engineers have to continually develop the process they utilize to meet these standards because of thermal maturation – the natural increase in the sulfur concentration of crude oil obtained from sources [1]. Thus, the existing technologies for desulfurization needs to be intensified to be able to handle the increasing sulfur concentration of the crude oil as well as the increasingly stringent legislation against sulfur emissions.

Because of this, the currently applied industrial process of fuel desulfurization, which is hydrodesulfurization (HDS) is operated using extreme conditions – high temperatures and high pressures [2]. Also, the most common sulfur compounds in a fuel, which are dibenzothiophenes (DBT), benzothiophenes (BT), and thiophenes (T) – refractory compounds – were found to be less reactive to HDS [3]. It is for these reasons that HDS needs either an assistance or replacement and intensification.

Oxidative desulfurization (ODS) has gained interest in the recent years because of its potential to answer the concerns in HDS. For one, ODS can be accomplished using ambient conditions and without the use of the expensive hydrogen gas. The use of heteropolyacids (HPAs), particularly phosphotungstic acid, as catalysts in a hydrogen peroxide oxidizing system has proved to be effective (more than 99% efficient) in oxidizing the sulfur compounds [4]. Supporting this HPA can improve its catalytic activity by increasing the effective surface area and making it more economical because less HPW is utilized in the process and the catalyst may be recovered by simpler separation methods.

In this paper, the application of ultrasonication as assistance to ODS process – Ultrasound-Assisted Oxidative Desulfurization or UAOD – was investigated. Ultrasonic irradiation creates fine emulsions that

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# Investigation on mixture design of one-part geopolymer from fly ash and water treatment sludge

*Vuong* Ho[1], *Aileen* Orbecido[1] and *Michael A.* Promentilla[1*]

[1]Chemical Engineering Department, Gokongwei College of Engineering, De La Salle University, Manila, Philippines

**Abstract.** This study presents a one-part geopolymer system from coal fly ash and water treatment sludge. Geopolymer is typically produced from two parts namely the aluminosilicate solids, which is typically sourced out from industrial by-product, and an alkali activator solution which reacts with aluminosilicate solids to form an inorganic polymeric network. For a one-part geopolymer system, the solid binder with activators will just be added with water to address the drawback of corrosive and viscous alkali activator solution. Formulation of the proportion of geopolymer precursors with the two solid alkali activators namely sodium hydroxide and sodium aluminate was conducted using statistical mixture design. Effects of each components as well as interactions between them were evaluated by step-wise regression analysis. It was found that high alkali content decreased the compressive strength of binder. Meanwhile, the incorporation of sludge in this system helps reduce the unit weight of samples. Multiple response surface analysis that maximized compressive strength and minimized unit weight resulted in the optimal combination of 18.9% sludge, 76.1% fly ash and 5.0% NaOH.

## 1 Introduction

The shortage of raw materials for Ordinary Portland Cement (OPC) production and the stress of global warming urged many cement companies to find sustainable alternatives. In recent years, many efforts have been dedicated to replace OPC with coal fly ash (FA) in cementitious concrete. FA is a by-product from coal-fired thermal power plant. It contains large proportions of reactive silicate and aluminate that can be used as a geopolymer precursor which reacts with alkali activator solutions to form inorganic polymeric network [1]. The FA-based geopolymers have found to have superior strength for construction applications [2,3].

Water treatment sludge (WTS) is residue from water treatment plant. It is classified as non-hazardous waste and usually disposed to landfills. However, WTS has potential applicability on the manufacture of geotechnical materials [4,5]. For example, WTS was used as lightweight aggregate in FA-based geopolymer [6].

In this study, FA and WTS mixtures were activated by solid sodium hydroxide and sodium aluminate. The usage of solid activators creating a one-part geopolymer system could address the drawbacks of using corrosive and viscous alkali activator solution in a two-part geopolymer system [7]. Note that geopolymer is typically produced from two parts namely the aluminosilicate solids, which is typically sourced out from industrial by-product, and an alkali activator solution which reacts with aluminosilicate solids to form the hardened binder.

## 2 Materials and Method

### 2.1 Materials

Coal fly ash was collected from a certain power plant in Luzon, Philippines and used without any pre-treatment. The wet WTS was collected from a water treatment plant in Manila, Philippines. Wet sludge was dried at 105°C overnight then ground using an abrasion machine for 10,000 cycles. Anhydrous sodium hydroxide (99% NaOH) purchased from a local supplier in the Philippines and anhydrous sodium aluminate (50-56% $Al_2O_3$; 40-45% $Na_2O$) from Sigma-Aldrich were used as activators.

### 2.2 Geopolymer synthesis

Firstly, FA was mixed with WTS in mechanical mixer. Solid sodium hydroxide (NaOH) and sodium aluminate ($NaAlO_2$) were added to raw materials and continuously blended for a minute. After that, water was poured into the solid mixture. The mixing was done for 10 to 30 minutes using a mechanical mixer. The paste was poured into 50x50x50 mm molds. Steel molds were greased beforehand for easier demolding. To prevent the

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# Evaluation of *Ankistrodesmus falcatus* for Bicarbonate-Based Integrated Carbon Capture System (BICCAPS)

*Arnel B.* Beltran[1,*], *Daniel C.* Gravador[1], *Bea Lutchi O.* Ty[1], *Joceleen Michelle O.* Wu[1]

[1]Chemical Engineering Department, De La Salle University – Manila, Manila, Philippines

**Abstract.** This study evaluates the performance of alkaliphilic microalgae *Ankistrodesmus falcatus* in the Bicarbonate-based Integrated Carbon Capture and Algae Production System (BICCAPS). The system utilized bicarbonate as carbon source for microalgae production. BICCAPS parameters such as pH, algal biomass productivity and $CO_2$ utilization (inorganic carbon conversion, $C_i$) were observed at different sodium bicarbonate ($NaHCO_3$) loading concentration and type of culture media. The highest productivity was observed at 10 g/L of $NaHCO_3$ loading in BRSP medium at 3.5539 mg/L/day. This value is 30% lower compared to the control experiment (continuously aerated bioreactor). The $C_i$ values of the different system ranges from 1.17 x $10^{-4}$ to 1.51 x $10^{-4}$ moles/L/day. Both the pH of the BRSP and NPK media at 10 g/L and 30g/L loading of $NaHCO_3$ increased through time. The result shows that *A. falcatus* has a potential in BICCAPS utilization.

## 1 Introduction

The increasing level of carbon dioxide ($CO_2$) in the atmosphere had caused severe impact in global temperature. The mean $CO_2$ concentration in the atmosphere had passed the 400 ppm mark which is beyond the safety limit of 350 ppm [1]. The major culprit for in the increase in $CO_2$ in the atmosphere is the utilization of fossil fuel for energy generation and trasnportation. Several strategies is been used to reduce or prevent further release of $CO_2$ such as improvement in the technology, energy conservation, utilization of renewable technology and $CO_2$ sequestration [2].

Carbon Capture and Sequestration (CCS) system is the most viable techniques to be applied for exisiting industrial plants. In CCS system, the $CO_2$ gas is captured in an amine-based or carbonate-based adsorbents and stored in a vessel as compressed gas and transported to a place where it could have negligible effect on the environment [3]. Still, these technologies are energy intensive because of the thermal treatment required to regenerate the absorbents rendering it to be expensive [4]. Alternative CCS technology utilized alkaline solutions (e.g. NaOH) and microalgae in photobioreactor [5-6].

The popularity of microalgae as CCS is due to high growth rate and capture carbon capability on top of that it could be used as a potential fuels source. One of the several microalgae that has been evalauted as biofuel feedstock is *Ankistrodemus falcatus* [7-9]. Although, study for it as potential for CCS were limited. One study reported that *A. falcatus* grew in a specialized PHM medium able to havecarbon removal rate of 20% utilizing a 2% $CO_2$ feed gas stream [10]. *A. falcatus* has reported to contain a lipid of more than 35%, optimal growth length of 0.20 μm and a biomass productivity of 7.9 mg/L-day in a BG-11 medium [8]. Also, it was capable to produce a lipid yield of 67.2%, but it had already undergone a morphology change. With another study, it was known that nitrogen, phosphorus and iron nutrient has a significantly effect in lipid productivity and can obtained biofuel conversion rate as high as 91% [7].

Bicarbonate-based Integrated Carbon Capture and Algae Production System (BICCAPS) is an improvement of CCS system where both chemical and biological systems together is being utlized [4]. The technology captures $CO_2$ in the form of bicarbonate as alkali solution and utilizes it as carbon source for microalgae. The microalgae should be able to withstand a highly alkaliphilic environment for this system to be viable thus limit the study to some cyanobacteria species.

Liu et al. conducted a study that utilized *Chlorella sp.* and *Scenedesmus obliquus sp.* in a continuous system using bicarbonate-based media and observed that the microalgae was able to grow at a rate of 0.41 g (dry weight) per gram of $HCO_3^-$ [11]. In another study, it was determined that *Euthalothece* ZM001 species has potential for BICCAPS system due to its biomass productivity of 1.21 g/L-day while the *Spirulina* species

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# Non-invasive Detection of Human Body Liquor Intake Based on Optical Biosensor

*Christian Jhoart* Abaoag[1], *Ralph* Alforque[1], *John Benedict* Ordoño[1], and *Edna* Quinto[1,2,*]

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**Abstract.** Alcohol-related incidents are increasing despite the implementation of RA 10586, the Anti-Drunk or Drugged Driving Act of 2013. Conventionally, blood alcohol content (BAC) is tested by gas chromatography or breathalyzers. This work aims to design and fabricate a paper-strip based sensor for the detection of alcohol using saliva as biomedium. The sensor will act as an alternative alcohol detection platform, which will provide low cost analysis of BAC. Different tests were undergone using p-nitrophenol, PNP, as recognition element, which include stability, repeatability, and sensitivity. In order to establish the change of PNP in the presence of alcohol, a UV-Vis spectrophotometer was used. For stability and repeatability, an RSD of 1.24% and 4.61% were obtained, respectively. Furthermore, the sensitivity to alcohol concentration was found to have an $R^2$ value equal to 0.987. For the paper-strip application, 10 mm x 60 mm optical sensing membrane (OSM) with immobilized PNP was prepared. It is analysed through the use of digital image captured by a smartphone camera. The RGB values are then measured using the ImageJ software application. The stability, repeatability, and sensitivity of biosensor are 1.85% RSD, 2.23% RSD, and 0.9731 coefficient of linearity, respectively. This method is a promising alternative to breathalyzer.

## Introduction

Being charged with DUI or DWI (Driving Under the Influence or Driving While Intoxicated) is a very serious offense. If you are found guilty, it will significantly impact your ability to drive (with suspended or revoked license), increase your insurance rates, and may even include a fine and jail time. A guilty court verdict can further affect your employment options, financial future, and ability to travel internationally. [1]

Field Sobriety test and chemical blood test are two of the most commonly performed by policemen in order to detect if a person is under the influence of alcohol.

According to Badugu, *et. al*., blood sampling is impractical especially in today's generation, since other bodily fluids, such as sweat and saliva, give far better results compared to the blood tests. Using the latter fluid, different components of the blood can be determined: uric acid, lactic acid, alcohol concentration, glucose level, etc. [2]

According to Philippine National Police-Highway Patrol Group (PNP-HPG), road accidents are one of the leading causes of death in the Philippines. In 2012, there was an average of 227 road accidents per day according to MMDA. [3] Vehicular accidents associated with drunk driving is steadily increasing in number according to HPG. In 2012, 375 car accidents were recorded nationwide involving drunk drivers; 390 in 2013, and 498 in 2014. [4]

Breathalyzer units were distributed and have been in disposal of officer in NCR, Metro Davao, and Metro Cebu since March 12, 2015. [5] The device uses a platinum fuel cell that reacts specifically to presence of alcohol, and will not be affected by external or environmental factors. It is also already calibrated according to the Philippines' legal blood alcohol content (BAC) limit of 0.05%. For non-pofessional drivers, their BAC should not exceed 0.05%. Professional drivers and drivers of public utility vehicles (PUVs), however, must have no trace of alcohol at all- anything higher than 0% will be subject to penalty. [6]

To date the Philippine government will need 3,000 breathalyzers if one is to one ratio per precinct is the target as there are 3,000 precincts throughout the country. [7]

To solve this problem, the researchers intend to design a low-cost, portable, user-friendly version of breath analyser by finding a suitable reagent that is capable of detecting quantitatively both the presence and concentration of ethanol present inside the body through human saliva. The presence of ethanol at varying concentration in saliva will reflect different intensities of visible color change on the biosensor.

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